used in laryngeal cases. Further disinfection of the room is not necessary, and no case of further infection has occurred. Sometimes mercurial ointment can be freely applied to the skin of the neck and throat with benefit, and occasionally he used borax in the manner recommended by Hood, a small quantity being put in the mouth every half-hour, by day and night, for several days.

MEDICINE.

UNDER THE CHARGE OF

W. PASTEUR, M.D. LOND., F.R.C.P.,

ASSISTANT PHYSICIAN TO THE MIDDLESEX HOSPITAL; PHYSICIAN TO THE NORTHEASTERN HOSPITAL FOR CHILDREN;

AND

SOLOMON SOLIS-COHEN, A.M., M.D.,

PROFESSOR OF CLINICAL MEDICINE AND APPLIED THERAPEUTICS IN THE PHILADELPHIA POLYCLINIC; PHYSICIAN TO THE PHILADELPHIA HOSPITAL.

SPONTANEOUS PNEUMOTHORAX AND PNEUMO-PERICARDIUM.

MR. R. A. LUNDIE, F.R.C.S., records the following case in the *Edinburgh Medical Journal*, 1891, No. 1805: A lawyer's clerk, aged twenty, with a tubercular family history, while sitting quietly at home after dinner was seized with sudden severe pain in the left chest. He was forced to take to his bed at once on account of the intense dyspnœa on the slightest exertion. When seen, four days later, there was well-marked left pneumothorax, and he complained of a "feeling of trickling" in the left side. The whole left side was hyper-resonant, and no heart dulness could be made out anywhere. Heart-sounds faint, but otherwise normal, except when he had the "trickling feeling," when the first sound acquired a semi-musical quality. He recovered rapidly from this attack, and returned to his work in less than a month. At this time the heart was normal in position and action.

Not many days after, as he was walking quietly home from work, he was seized with pain in the left side. Next day he complained of discomfort in the left chest with a sensation of "splashing" there. The heart impulse in the fourth and fifth interspaces had a peculiar thrilling feeling, and the heart-sounds were marked by singular, irregular, semi-musical accompaniments. On subsequent more minute examination it was found that there was a tympanitic area which occupied the position of a slightly enlarged pericardium; and the heart fell to the most dependent portion of it with each movement of the patient. The heart-sounds were obscured by irregular, tumultuous, tinkling accompaniments, such that a "peal of bells" was a more apt description of them than the "water-wheel." This was best heard with the patient on his left side. When he lay on his back the musical sounds were at times absent, though the heart-sounds retained a metallic ring. The diagnosis of pneumo-pericardium was confirmed by Dr. Brackenbridge, who pointed out that when the tympanitic area was rapidly percussed the pitch of the note changed slightly with each cardiac cycle. A fortnight later the præcordial area was still a trifle more resonant than normal. The heart-sounds were healthy, except for a faint murmur over the sternum at the level of the third cartilage. The pulse was never in the least irregular.

Ten months later the patient continued quite well, with the exception of occasional painful throbbing below the left nipple, which he never experienced before his illness. It never lasts more than a minute, and recurs at intervals of a week or so. He leads an active life, and is able to play cricket, etc. The most remarkable points of the case are summarized as follows:

1. The presence of a chronic morbid process in the chest, sufficient to lead ultimately to rupture of the pleura and pericardium, with an almost entire absence of symptoms.
2. The occurrence of pneumothorax in conditions of apparent health.
3. Backward displacement of the heart while pneumothorax was present.
4. Recovery from pneumothorax without any signs of inflammation or effusion.
5. The occurrence of pneumo-pericardium after an interval, also in conditions of apparent health.
6. The entire absence of irregularity of the pulse, disturbance of the circulation, or interference with the general health while air was present in the pericardium.
7. Recovery from pneumo-pericardium without any signs of inflammation or effusion, except the small, perhaps normal, amount of fluid in the pericardium indicated by the auscultatory signs.

ALBUMOSURIA.

DRS. LEE DICKINSON and W. K. FYFFE communicated to the Clinical Society of London (November, 1891) a series of twenty cases of pneumonia and allied conditions in which the urine contained albumose. The peptone spoken of in earlier papers on peptonuria would, in the present day, probably be called albumose. In no case was true peptone ever found, but whenever a biuret reaction was obtained this was found to be due to albumose precipitable by ammonium sulphate. After removing from the urine such proteid matter as was coagulable by heat it was treated with nitric acid and the biuret test, and in those cases where a positive result was obtained a pink color appeared at the junction of the fluids on floating the urine on to the caustic soda solution containing copper sulphate. The albumose (proto- and dextro-albumose) was sometimes present in large quantities—more than one per cent.

Judging from the results of experiments on animals, it seemed possible that diarrhœa, from which many of the patients suffered, might be due to albumose in the blood. A high mortality and serious sequelæ, apart from the development of empyema, characterized the cases brought forward.

The origin of the albumose is pus, or at least inflammatory exudation, especially that of pneumonia. Albumosuria also occurs in acute rheumatism. According to the authors its only clinical relation is with diarrhœa, and it has no special relation with organic disease of the kidney.

PULSATIONS AND MURMURS IN THE GREAT VEINS OF THE NECK.

In a thoughtful article under the above title, **DRS. SIDNEY RINGER** and **HARRINGTON SAINSBURY** discuss the physiological and clinical significance of pulsation in the internal and external jugular veins. The value of the paper is enhanced by copious references to the works of other observers.

The moving force causing the venous current is a *vis a tergo*, and the blood-flow into the chest is of a remittent character owing to the effects of the cardiac and pulmonary movements on the stream. As a rule, in health, the obstruction within the chest does not exceed the force urging on the venous blood. In health, under ordinary conditions, however, the remittent action of the venous flow may show itself as a pulsation, the beat of which will be caused by a *vis a tergo;* whilst in exceptional states in health, and more markedly in disease, such pulsation may be caused by a *vis a fronte.* Important time-relations mark theoretically the pulsations according as these are direct or regurgitant.

The following pulsations of cardiac rhythm are recognized.

1. Transmission across the capillaries of the intermittent impulses of the left ventricle.

2. Transmission of pulsation from the brain *en masse* to the veins issuing from the cranial cavity. The authors doubt whether pulsation visible at the root of the neck ever bears this interpretation.

3. Pulsation communicated from an adjacent artery.

(In these three varieties there is no hindrance to the onward flow of the blood, and in the first two the *vis a tergo* is the obvious efficient cause.)

4. Pulsation in the veins at the root of the neck extending a variable distance up the neck and owning as a cause intra-thoracic changes of pressure. The evidence appears to the authors strongly in favor of a normal jugular pulse in man the result of intra-thoracic changes, and not commonly visible owing to its feebleness and masking by the integuments. Pulsating jugulars, in disease, with overloaded right ventricle, are universally admitted. After discussing the distinguishing characteristics of arterial and venous pulsation the authors state, in regard to that under discussion, that neither the form of the pulsation, nor its site, nor the effects of posture, afford any reliable criteria for determining whether it be of health or disease. On the other hand, "If the veins of the neck, especially the external jugular, of a chlorotic woman be carefully watched in the recumbent posture, with the head slightly raised or not raised at all, it will frequently be determinable with ease that the filling of the vein, its beat, precedes slightly the carotid beat felt on the opposite side of the neck; perhaps it will be found even more readily that the collapse of the vein falls in exactly with the carotid impulse. With each cardiac cycle this sequence is repeated—presystolic filling, systolic collapse. In some forty cases of our own, including pathological cases, though chiefly consisting of anæmias without heart or lung mischief, the systolic collapse was noted in eleven certainly, in two with less certainty. Excluding six or seven cases of actual chest disease, and a few in which no note is recorded about pulsation, the proportion in which systolic venous collapse is observed in marked anæmia without thoracic disease becomes a considerable one, and

probably is little under one-half. The subjects were mostly lying quite flat when this was noted. . . .

"The evidence is fairly complete that the normal venous pulse, when visible, shows its main stroke in the presystole, its main collapse in the commencement of systole; and this accordingly is the point which we must seek to establish in the case of any vein which pulsates—its time-relations—for we shall see that the venous pulse of disease differs very decidedly from the normal pulse in respect of these relations."

This venous pulse of presystolic rise and systolic collapse is spoken of as physiological because it is found experimentally as a constant in healthy animals, and is occasionally seen in healthy men and women. How does the pathological venous pulse—the pulse of obstructed right heart—differ from the above?

This pulse is frequently double, and so far resembles the normal venous pulse. Careful observation of the time of pulsation, however, will show that one impulse, at any rate, falls in with the systole, the other, if well-marked, precedes the systole. There are thus presystolic and systolic impulses, the systolic collapse having been exchanged for a filling out of the vein. Obviously the systolic impulse of the vein is produced by the systole of the ventricle. Whether the tricuspid valve is competent or otherwise is not vital. The distended right auricle conducts back the ventricular pulse, and, as Gottwalt points out, it is the intervention of the flaccid auricle—in health —at the moment of ventricular systole which accounts for the absence of systolic impulse in the veins.—*Lancet*, 1891, Nos. 3561–62.

MORBID STATES OF THE HEART IN CHRONIC PHTHISIS.

Under this title, DR. W. S. FENWICK (London) publishes the results of an analysis of 1560 post-mortems made at the Brompton Hospital for Consumption, the results obtained being compared with the clinical notes of the cases.

In about 27 per cent. of the cases there was distinct evidence of hypertrophy of one or both ventricles. The causes of this were three-fold—a compensatory hypertrophy of the right ventricle in fibroid phthisis; left ventricle hypertrophy was mostly due to rheumatic endocarditis. In the remaining cases, about 9 per cent., there were hypertrophy and dilatation of the left ventricle associated with chronic interstitial nephritis. As regards the heart muscle it was "soft and fatty" in 11 per cent. only, being more generally described as "pale but healthy." No instance of tuberculous deposit in the heart was met with.

The writer lays some stress on the firm, laminated clots met with at the apex of the ventricle, or in the auricular appendix. In seven of the cases death occurred rapidly in the course of a chronic case. In each instance it was found that a piece of clot had been dislodged from the right heart and had blocked up a large branch of the pulmonary artery. The majority of the patients were females, and on six occasions the embolism lodged in the base of the right lung; once in the left.

No special importance is attached to slight thickening of the mitral and aortic valves met with in 12 per cent. of the cases. True endocarditis was encountered in 43 cases, in 30 of which the disease was evidently of old standing; in the remaining 13 it is stated to have been recent and acute.

Of the 30 chronic cases, there were 9 of mitral incompetence, 4 of mitral stenosis, 4 each of aortic stenosis and incompetence. In 5 mitral and aortic incompetence coexisted. In 3 mitral and tricuspid disease were associated. In 12 cases the tuberculous disease was "very old;" in 9 it had undergone recent extension, while in 5 miliary tuberculosis had supervened on old apical mischief.

Of the 13 acute cases, the mitral valve alone was affected in 6, the aortic valve alone in 2, both valves in 3. In 2 the mitral and tricuspid were affected. In 11 of the cases there coexisted a more or less pronounced condition of kidney disease, which, in the writer's opinion, may throw some light on the origin of the endocarditis. In two cases an acute attack of endocarditis occurred in patients in whom acute miliary tuberculosis had complicated the original tuberculous disorder.

In 4 cases congenital malformation of the heart was associated with phthisis. In 3 the foramen ovale was patent; in the fourth the right ventricle was subdivided by an oblique septum. Double phthisis ran a fairly rapid course in each case. Pulmonary tubercle was found in 7 out of 24 cases of thoracic aneurism. In 5 the aneurism involved the ascending arch. In 3 of these the lung disease was obviously recent, in the other 2 latent.

Looking to the clinical side of his tables the writer finds that fatal hæmoptysis occurred nearly twice as frequently in cases where the heart presented an increase in volume as under normal conditions.

With regard to adherent pericardium, which existed in about 7 per cent. of the cases, the symptoms of cardiac failure were usually pronounced during life; in a majority a considerable degree of cyanosis was present before death. The writer adopts the view that cardiac thrombosis is a frequent cause of death, and most likely to occur in cases in which, from laryngeal disease or other causes, the patient has been debarred from taking sufficient nourishment.

The physical signs are with difficulty distinguishable from those of pulmonary embolism, except that the latter are usually ushered in with greater suddenness, are of greater moment, and are apt to lead to the physical signs of consolidation of some portion of the lung.

With reference to the cases of chronic valvular disease a history of previous rheumatic fever existed in 17 of the 20 cases in which the mitral and aortic valves were affected. Of the other 10 cases of stenosis of the various orifices a history of rheumatism was obtained in 2 only. Hæmoptysis was more or less severe in 12 of these cases, and caused death in 4. It appeared to be most frequent in cases of stenosis of the mitral and tricuspid valves.—*Practitioner*, 1891, No. 281.

Medical Treatment of Perityphlitis.

The view, which appears to be gradually gaining ground, more especially among surgeons, that once inflammation of the appendix cæci has been diagnosticated these cases should be handed over for surgical treatment, has induced DR. **SAUNDBY**, of Birmingham, to put on record fifteen cases of appendicitis which have been under his care during the past six years.

Among these fifteen cases there was only one death—the only case treated surgically—and the post-mortem appearances led the writer to believe that life might have been spared had he adhered to purely medical treatment. 86.6 per cent. were cured, and 6.6 per cent. relieved. The average length of treatment is admittedly long, and a more rapid cure by surgical means might be claimed, though the writer is of opinion that a little time may fairly be sacrificed in view of the inevitable risks of surgical interference. The plan of treatment he adopts is rest, free evacuation of the bowels, hot fomentations or the ice-bag, with the addition, in chronic cases, of repeated blistering over the tumor. He strongly supports the method of treatment by the administration of full doses of sulphate of magnesium which was advocated by a recent American writer, Dr. W. T. Dodge.—*Birmingham Medical Review*, No. 157, 1891.

CASE OF TRAUMATIC ABSCESS OF THE LEFT ANGULAR GYRUS WITH CROSSED AMBLYOPIA AND WORD-BLINDNESS TREATED BY OPERATION.

DR. **BEEVOR** and MR. **HORSLEY** communicated the following case to the Ophthalmological Society of London: F. L. sustained an injury to left side of head last Christmas. Three weeks after accident he became unconscious, and had a general "fit." Six weeks after accident eyesight began to fail, and he vomited daily. He was admitted to the Hospital for Paralysis on March 9th with double optic neuritis and right hemianopsia. There was a seam three inches long along left side of head, which was tender and adherent to underlying parts. Abscess in left angular gyrus was diagnosticated, and Mr. Horsley operated. He found fracture of skull with necrosis corresponding to scar. On trephining, an abscess was found in the upper part of the angular gyrus and the outer surface of the occipital lobe. After the operation the boy had word-blindness, and on measuring the fields of vision the right was found to be contracted on the nasal side to twenty and on the temporal side to five, while in the left eye the nasal was reduced to ten and the temporal to fifty. Hernia cerebri developed and was removed, soon after which the boy died. Post-mortem: The dura mater was found to be thickened and adherent on left side to the margin of the silvian fissure as far forward as the ascending parietal convolution, to the lower two-thirds of the supra-marginal gyrus, to the posterior part of the superior and middle temporo-sphenoidal convolutions. The whole of the angular gyrus, except the upper fourth and anterior part of the outer occipital region on the horizontal section was much softened, extending across the hemisphere to the hernia cerebri.—*Medical Press*, 1891, No. 2742.

BLACK URINE AND BLACK ASCITES.

SENATOR (*Charité-Annalen*, xv., S. A.) states that a number of different pigments, having in common only their black color, have been included in the common designation, "melanin." He has recorded a case, in which the dark brownish-red urine, becoming darker on standing, responded to the test with potassium chromate and sulphuric acid, but at the same time contained considerable indican, to the presence of which the intensification of color is to be ascribed. The autopsy revealed the absence of melano-sarcoma. Derivates of biliary pigment in the urine may simulate melanin. It cannot, therefore, be concluded that a melanotic tumor exists if the urine reacts to chromic acid. All melanotic tumors are not attended with elimination of melanin in the urine. It should be borne in mind that the urine of patients with melanotic tumors may contain melanin and yet not react to chromic acid. Bromine water and chloride of iron differentiate melanogen from indican; the latter reacts to neither. In a case of extensive melanosis Senator observed, in addition to melanuria, the evacuation of dark-brown ascitic fluid, which after standing a few days precipitated a dark sediment. The pigment reacted to bromine water in the same manner as that obtained from melanotic urine. In the latter the pigment was present principally as melanogen; in the former, as melanin. The urine passed by four rabbits, into whose peritoneal cavities melanin from melanotic tumors had been injected, contained considerable indican, but no melanogen—it did not become darker in color on treatment with bromine water.—*Centralblatt für die medicin. Wissensch.*, No. 13, 1891.

KERAUNO-NEUROSES.

FRANKL-HOCHWART (*Zeitschrift für klinische Medicin*, Bd. xix., H. 5 u. 6, 1891) places among the traumatic neuroses the condition, attended by peripheral palsies, that obtains in persons who have been struck by lightning, to which he applies the designation kerauno-neurosis, and of which he reports two illustrative cases. One is that of a cook, twenty-four years old, without nervous antecedents and with no history of syphilis or alcoholism, who, while at work during a rain-storm, was without premonition struck to the ground. On returning to consciousness, two hours later, the course pursued by the current was indicated by large blisters on the surface of the body. A sense of burning pain was felt in the chest and in the occipital region. There were paresis of the extremities, dyspnœa, and defective speech. For one day vision was abolished. From time to time lancinating pains were felt in the upper extremities, especially in the right. Severe sacral pain was a prominent manifestation. In the course of several days complete palsy of the lower extremities developed; the upper became paretic. Diplopia occasionally manifested itself. Sensation was benumbed on the right side. In the course of three months some power of locomotion was regained, though restoration was never complete. The mental condition was depressed. Speech was slow. A little less than five years after the accident, the woman was suddenly seized with vertigo, headache, and vomiting. She lay in bed, was apathetic, and slowly replied to questions. The sense of smell was found blunted on the left, absent on the right. The sense of taste appeared impaired on the left. The pupils were equal, moderately dilated, and prompt in reaction. The fundus was normal, but the fields of vision were contracted. Punctures were imperfectly recognized on the left half of the face. The gait was fairly good for short distances. If, while standing or walking the eyes were closed, decided swaying occurred. Muscular power was diminished in all four extremities. The movements of the upper extremities were slightly ataxic. The knee-jerks were exaggerated, but there was no ankle-clonus.

The second case was that of a railroad watchman, fifty-eight years old, also without neurotic antecedents or a history of syphilis or alcoholism, who, during a storm, when about to manipulate a telegraph instrument, saw a blue flash and felt a severe shock in the right hand; the right arm fell to his side, and a sudden pain was felt to dart through the right arm and leg, which for ten minutes were powerless, and for three days remained cold and stiff. This sensation of cold reappeared subsequently once or twice a month for several hours. Some two years later the man was seized with severe pain in the right leg that lasted for two weeks, when it moderated—recurring, however, from time to time in both arm and leg. Vision became impaired and muscular power on right side diminished. Convulsions frequently occurred in the right leg. Occasionally there was intense sacral pain. Memory became impaired. The right pupil was smaller than the left; the reactions were tardy. The fundus was normal, though the fields of vision were contracted. There was slight tremor of the tongue. The circumference of the right lower extremity was smaller than that of the left. The right leg was dragged in walking. The station was good. When the eyes were closed there was some ataxia of movement of the right upper and lower extremities. The tendon reflexes were exaggerated.

UNILATERAL PALSY OF CEREBRAL NERVES DEPENDENT UPON CARCINOMA OF THE BASE OF THE SKULL.

STERNBERG (*Zeitschrift für klin. Medicin*, 1891, Bd. xix., H. 5 u. 6) has reported the case of a woman, fifty-seven years old, with no diathetic family history, who had borne seven children, and in whom the menopause had taken place seven years previously. For a year there had been a vaginal discharge, with emaciation. Headache, especially frontal and occipital, and on the right side, had been complained of for two months. In the previous six weeks it had been noticed that the hearing upon the right side was impaired, and that diplopia manifested itself when the eyes were directed to the right. For fourteen days speech had been defective and there was some difficulty of deglutition. The headache became aggravated in intensity; the pain assumed a lancinating or boring character, but occasionally remitted. Food would sometimes be regurgitated through the nose. The head was somewhat inclined to the right. The folds of the forehead, of the eyes, and of the nose and upper lip, were less well defined on the right than on the left. The right angle of the mouth drooped; from it saliva occasionally dribbled. The pupils were equal and reacted to light, and with accommodation. All the movements of the eyes were well performed, except that of the right eye outward; as a result there was homonymous diplopia. Vision was otherwise unimpaired; no lesion of the fundus was found. The conjunctival reflex was absent, the corneal reflex present on both sides. No olfactory defect was detected. The right half of the forehead displayed a diminution of sensibility to touch, temperature, and pain. The skin of the face was otherwise hyperalgesic. On opening the mouth the point of the chin deviated to the left. In gritting the teeth, the right masseter acted but imperfectly. The right side of the head, especially in the region of the mastoid process, was sensitive to percussion. Sudden pressure upon the vertex, as well as rapid lateral movements of the head, caused pain. The tongue protruded and deviated to the right. The right half of the tongue was considerably smaller than the left, and occasionally displayed fibrillary contractions. At rest, the uvula and soft palate were symmetrical and median in position. Upon intonation the right side moved less than the left. Irritation of the right half of the soft palate induced retching less readily than irritation of the left half. The sensibility of the cheek and of the right half of the tongue was unaltered. Taste was imperfect on the anterior part of both halves of the tongue, but decidedly impaired upon the posterior part of the right half. Vaginal examination disclosed the presence of a hard, nodular, disintegrating mass, involving the vaginal portion of the uterus and the posterior and anterior walls of the vagina. The uterus was enlarged and fixed. A diagnosis of carcinoma of the uterus, with metastatic deposits at the base of the skull, involving the right cerebral nerves, was made. The symptoms grew progressively worse; the palsy of the tongue became complete, but improved temporarily in response to faradic stimulation; death, however, ultimately ensued.

At the autopsy a small new-growth was found at the apex of the petrous portion of the right temporal bone, involving the Gasserian ganglion, the commencement of the trigeminal nerve, and the sixth nerve, and partially occluding the internal auditory meatus. The facial and auditory nerves appeared thickened and reddened. The glosso-pharyngeal was surrounded by an extension of the growth, and was also swollen and reddened. At the margin of the foramen magnum, especially about the anterior condyloid foramen, the dura was the seat of a thin layer of growth that surrounded the hypoglossus, which was thickened and reddened. The lateral sinus contained a whitish-red coagulum that was continued into the jugular vein. A metastatic growth was found on the left eighth rib two fingers' breadth external to the chondro-costal junction. The small pelvis was occupied by a large adherent tumor that proved to be carcinomatous, originating from the posterior vault of the vagina.

COMPARATIVE STUDIES OF THE PARASITES OF THE RED BLOOD-CORPUSCLES.

In an endeavor to determine the relation of the parasites found in the blood of lower animals with those found in the blood of man, CELLI and SANFELICE (*Fortschritte der Medicin*, 1891, Nos. 12, 13, and 14), availing themselves of the material offered by the Roman Campagna, extended their investigations to a large class of animals, both cold-blooded (frogs, tortoises) and warm-blooded (birds, man). Daily examinations of the recent blood were made, the same method being always employed. The blood was imbedded in paraffin kept at the temperature of the room, or in a thermostat at 98.6°. Dry preparations were stained with iodine-hematoxylon, fresh preparations with methylene-blue dissolved in ascites fluid.

Celli and Sanfelice succeeded in finding in the blood of frogs and tortoises both intra-corpuscular and free parasites, that differed in different kinds of animals. Inoculation experiments from frog to frog were not encouraging. Injections into the pulmonary artery of blood in which sporulation was going on were followed in one of three frogs by the appearance of small and medium-sized parasites. Similar injections into the cavity of the heart succeeded in but one frog. In both cases a doubt existed whether the parasites found might not have existed previously, but have been latent. Inoculations from tortoise to tortoise, and from frogs to other animals, were also less successful.

Observations were made upon two hundred birds. It was at once evident that the intra-corpuscular parasitism was in them more complete than in cold-blooded animals, that is, in birds the parasites have a more intimate intra-corpuscular existence, and live at the expense of the hæmoglobin, which they convert into melanin—as a result of which they display black pigment granules. Besides this, several varieties of parasites may be found in the same animal. Some of the parasites are of slow, some of accelerated, and others of rapid development. Those of the first kind are extremely resistant.

As a result of inoculations from one bird to another of blood containing "medium-sized," "large," and "free" forms, it was found that the parasites of the red blood-corpuscles are reproduced (but not always) in animals inoculated with the blood of animals of the same kind and variety. They have either a certain degree of individualized existence, and a special acclimatization for each variety, so that forms that appear morphologically identical are perhaps not parasitologically so, or the nutritive substratum, *i. e.*, the faculty of immunity, is not alike in all individuals of one and the same variety.

Celli and Sanfelice divide the malarial fevers of Rome, as seen in man, into two groups—mild and severe; or, winter-spring and summer-autumn. These again may be (*a*) quartan (combinations of which are represented by the double and treble quartan or triquetan quotidian); (*b*) tertian (double tertian or bitertian quotidian): (*c*) quotidian (fever with protracted attacks, subsistent, subcontinuous and pernicious fever). To each of these main types correspond various forms of parasites morphologically and biologically distinct. The cycle of development may be abbreviated; thus arise anticipating tertians and quartans.

In the fevers of quartan type the intra-corpuscular cycle of development is completed in three days. At first there appear small, amœboid forms, which rapidly become pigmented; then there are to be seen round, slightly pigmented, slightly motile masses, which neither protrude nor withdraw pseudopodia, with tardy movement of the black granules; they grow until they occupy the entire red cell, without deforming it, but taking up its coloring matter. Sporulation takes place in the adult parasite by the formation of a rosette of from nine to twelve spores about a collection of pigment; exceptionally it occurs as a premature development of at most from six to eight spores in the not entirely occupied red corpuscle. The free phase has but little significance. While a greater or smaller number of adult forms undergo sporulation, others (less commonly than in tertian and quotidian) become free in the plasma and degenerate, the pigment losing its motility, and the forms disintegrating or extending flagellæ that slowly oscillate. By their slowness of development, and their slight degree of motility, as well as by the preservation of the red blood-corpuscles, these forms remind one of those of slow development in birds.

In the fevers of tertian type, there are at first small amœboid forms that grow and become laden with pigment, while they remain in active movement; the pigment-granules, which are usually fine, are also in active movement; the blood-corpuscle swells, the hæmoglobin is altered, losing its color, or becoming the color of old brass. Sporulation may take place prematurely in the medium-sized forms, and more frequently in the large forms that occupy the entire blood-corpuscles; in such a case there is an aggregation of from fifteen to twenty spores, and in the other of from fifteen to twenty surrounding the mass of black pigment usually in the centre. The adult forms that do not undergo sporulation, and that pass from the red corpuscles into the plasma die, *i.e.*, they become larger, apparently hydropic, present vacuoles, extend flagellæ, and extend masses with granules in active movement. The analogy with the form of moderate rapidity of development in the lark is striking; amœboid movement only is wanting.

In fevers of the true quotidian type there are at first small intra-corpuscular forms, with active amœboid movement, which become round and pigmented immediately before the onset of a new paroxysm; the pigment is collected at the centre, and the surrounding parasitic mass breaks up into spores. Fortunately all do not undergo sporulation—a portion die in the shrunken red blood-cell that has become brass-colored; others continue to grow, remaining round and becoming free; more frequently they become extended, and distribute themselves at the periphery of the red blood-corpuscle; they continue their extension, and curve round to form crescents. Meanwhile the red blood-corpuscle has become paler, and finally disappears; at most there remains a margin at the concavity of the crescent, and almost always a layer of hæmoglobin surrounding the parasitic mass. Recent observations have failed to confirm the occurrence of sporulation. The crescents degenerate more slowly at ordinary temperatures than in the thermostat, while those of the rapid cycle, which have begun to sporulate in the circulating blood, complete their sporulation. The crescents become egg-shaped or round; the movement of the pigment-granules may be very active, but only very rarely are flagellæ extended. In the course of from five to ten days, sometimes earlier, the phases of another kind of degeneration may be observed. The red blood-cell in which the parasite develops again becomes more distinctly visible; the layer of hæmoglobin surrounding the parasite disintegrates, and then the parasite itself disintegrates. Thus, pale fragments of the red blood-corpuscle with the hæmoglobin-colored parasite-mass, and with accumulated or disseminated pigment-granules, may be seen. The hæmoglobin-colored crescent may also be seen immediately after the removal of the blood—from which it must be concluded that the degeneration has taken place in the circulating blood. Slowly the hæmoglobin color fades, and of the whole mass only the black granules remain.

Inoculations with blood containing crescents and parasites in sporulation respectively were attended with negative results. Inoculations with splenic fluid obtained several hours after death from cases of pernicious fever of two spleenless guinea-pigs, two normal guinea-pigs, two spleenless white rats, three normal white rats and two kept on ice, a porcupine and a bat, two doves, two turtle-doves, and numerous frogs and tortoises and other cold-blooded animals, were all negative.

In the various classes of vertebrates, the parasites considered have the following common characters: 1. *A seat in the red blood-corpuscle*, in which they remain during the entire intra-corpuscular stage, which may normally advance to sporulation; those forms that after a longer or shorter residence in the red blood-corpuscles do not undergo sporulation, have a more or less short free stage in the plasma. So that the analogy, but not the identity, of the various intra-corpuscular parasites in the various animals, would be the following: For the intra-corpuscular stage, between the respective small, medium-sized, and large forms, to the stage of sporulation in batrachians, reptiles, birds, and man; for the free stage, in the blood-plasma between the drepanidium of batrachians and of reptiles, the free forms in the blood of birds, the quartan, tertian, and quotidian preceding the free phase; the forms that do not sporulate have an intermediate stage of intra-corpuscular existence in which the forms correspond in the various animals examined. 2. *Endogenous reproduction through gymnospores* without preceding encapsulation. 3. *A structure composed of two substances*, of which one takes up much and the other little color, and a vesicular nucleus.

One differential character resides in the fact that in cold-blooded animals the hæmoglobin is not reduced, and, as a rule, the red blood-corpuscle is not destroyed. In birds and in man, on the contrary, the blood-parasites are sustained at the expense of the hæmoglobin, which is converted into melanin —whence results the melanæmia. Ascending from the lower animals to man, the free phase in the plasma is seen to progressively diminish, and the intra-corpuscular stage to increase in importance; at the same time, the parasitic activity increases in correspondence with the rapidity of reproduction. In man, before sporulation takes place, all forms display active amœboid movement, of which only indications are present in lower animals. The relationship between the parasites of birds and those of man is so close that the forms of slow, rapid, and accelerated development correspond with the quartan tertian, and quotidian.

Celli and Sanfelice are unwilling to state whether or not various forms represent a single variable parasite or definitely different varieties. All of the intra-corpuscular organisms are conceded to be sporozoa, divisible into three classes: 1. Gregarina; 2. Myrosporidia; 3. Sarcosporidia; to which may be added a fourth—hæmosporidia. The last are characterized not only by their seat in the red blood-corpuscle, but also by their mode of development. In addition to the differences in the developing and the adult forms, the hæmosporidia do not become encapsulated before they form spores, and their spores contain no sickle-shaped bodies, as do the coccidia and gregarina, nor polar bodies, as do the myrosporidia. Hæmosporidia may be divided into three genera: Hæmo-gregarina (batrachia and reptilia); hæmo-proteus (birds); plasmodium (man). The chief characteristics of the three genera are respectively as follows: 1. Inabilty to reduce hæmoglobin and to destroy the red blood-corpuscle; the free stage in the blood-plasma is well organized and reminds one of free gregarina. 2. Conversion of hæmoglobin into melanin; the free stage is insignificant. 3. Active amœboid movement preceding sporulation.